Lakeland Regional Health Operating Room Dashboard Team

Lakeland Regional Health®

Team Members:

Name - Major - Role

Joshua Kennedy - Business Analytics - Team Communication Lead

Renato Silva e Silva - Business Analytics - Documentation Lead

Majella Scheyhing - Business Analytics - Project Manager

Amanda Rodriguez - Data Science - Testing/Quality Assurance

Kenneth Pierce - Computer Science - Technical Lead

Kaleb Walden - Computer Science - Technical Lead

Problem Statement:

Lakeland Regional Health has asked us to create them a functioning dashboard that works in real-time within their Operating Rooms throughout the hospital. It must account real-time information including operation information and cleanup/transition. The aim is to have it a 30-minute turnaround time for 80%+ of their weekly cases. It must function properly with current implemented applications used.

Project Goals/Deliverables:

- Ability to pull/insert needed information at anytime and move this collected data around using a local server interface.
- Dashboard information must include:
  - patient information
  - OR operation information
  - summary statistics with turnaround time.
- Creation of a working dashboard for their Operating Rooms with populated data and incorporation of Tableau Functionalities.

Customer Needs

Primary

- Elapsed time tracking
- Live status updates
- Improved workflow coordination
- Patient tracking

Secondary

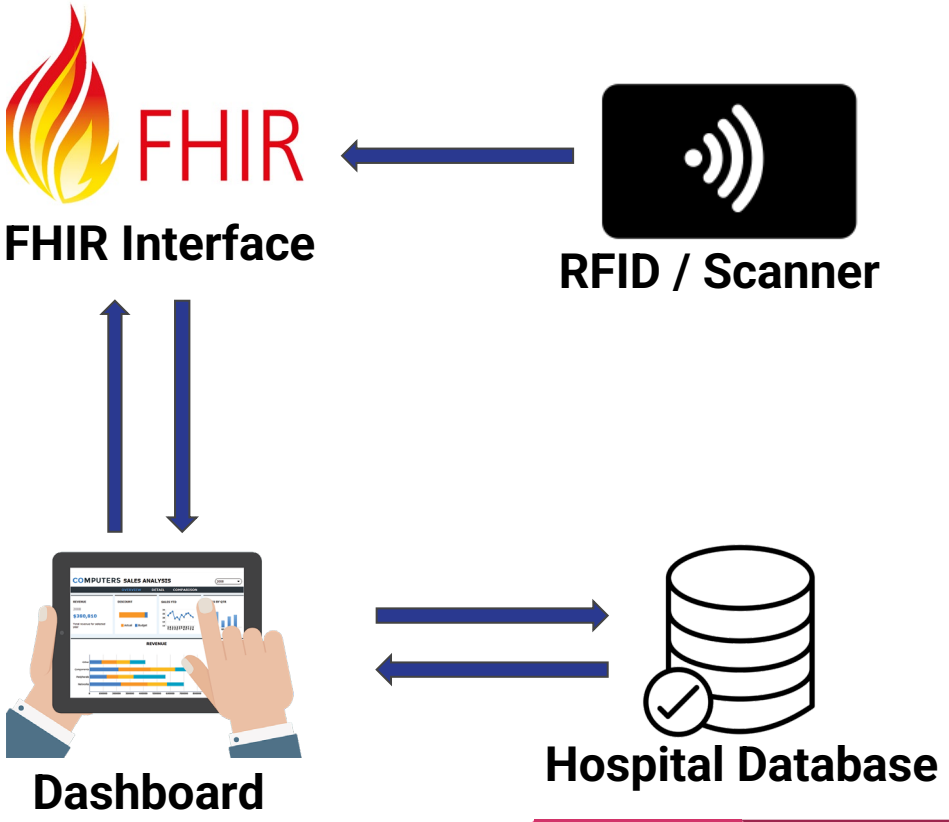
- KPI tracking and analytics
- Compliance/reporting
- Storing historical data
- Equipment management

Types of Solutions Considered Selected Path

- Build a Whole New Dashboard
  - Develop a completely new software/app.
  - More time-consuming and harder to integrate with existing systems.
- Create Dashboard in Tableau
  - Fits into their current system.
  - Uses the existing database but lacks real-time data.
- **Create Dashboard in Tableau and Implement New Data Transfer Interface**
  - Using *HL7* (Health Level Seven) and *FHIR* (Fast Healthcare Interoperability Resources).
  - A 24/7 interface handles data transfer and requests.
  - Allows to still use Tableau.
  - Tableau does not work well with **LIVE data**

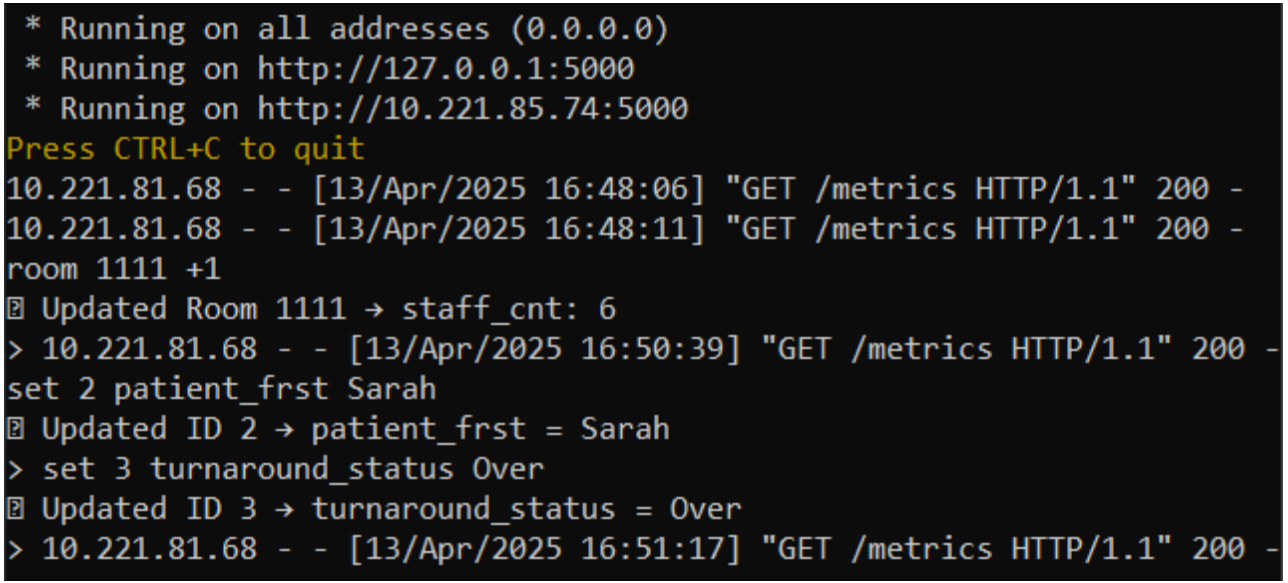
Data Transfer Interface

- FHIR API server
  - Python
  - Javascript
  - Runs 24/7
  - Live Json
- Tableau Extension
  - Updates in seconds
- HL7 and FHIR for security
  - Encryption
  - Authentication
  - Firewall



Demonstration of Server

Server Side

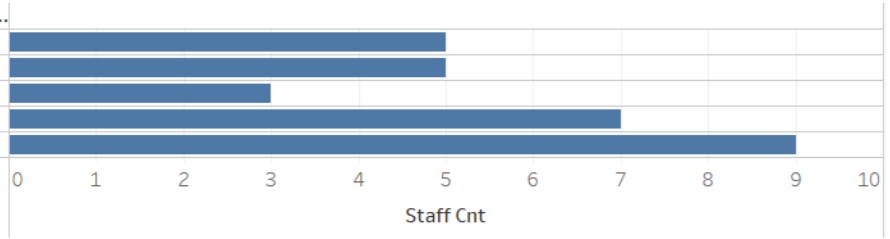

* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5000
* Running on http://10.221.85.74:5000
Press CTRL+C to quit
10.221.81.68 - - [13/Apr/2025 16:48:06] "GET /metrics HTTP/1.1" 200 -
10.221.81.68 - - [13/Apr/2025 16:48:11] "GET /metrics HTTP/1.1" 200 -
room 1111 +1
Updated Room 1111 → staff_cnt: 6
> 10.221.81.68 - - [13/Apr/2025 16:50:39] "GET /metrics HTTP/1.1" 200 -
set 2 patient_frst Sarah
Updated ID 2 → patient_frst = Sarah
> set 3 turnaround_status Over
Updated ID 3 → turnaround_status = Over
> 10.221.81.68 - - [13/Apr/2025 16:51:17] "GET /metrics HTTP/1.1" 200 -

Demonstration of Tableau

Tableau / Client Side

Sheet 1

ID	rm ID	patient ID	Patient F..	Patient L..	Date	Turnarou..	Turnarou..	Turnarou..
1	1111	1001	John	Smith	2025-01-01	0:00:00	0:35:52	Over
2	1112	1002	Jame	Johnson	2025-01-02	1:00:00	1:28:20	On-Time
3	1113	1003	Madison	Williams	2025-01-03	2:00:00	2:29:04	On-Time
4	1114	1004	Joe	Brown	2025-01-04	3:00:00	3:28:30	On-Time
5	1115	1005	Mary	Jones	2025-01-05	4:00:00	4:27:15	On-Time



Refresh 1: Change Staff to 5 (+1) in Room 1111.

ID	rm ID	patient ID	Patient F..	Patient L..	Date	Turnarou..	Turnarou..	Turnarou..
1	1111	1001	John	Smith	2025-01-01	0:00:00	0:35:52	Over
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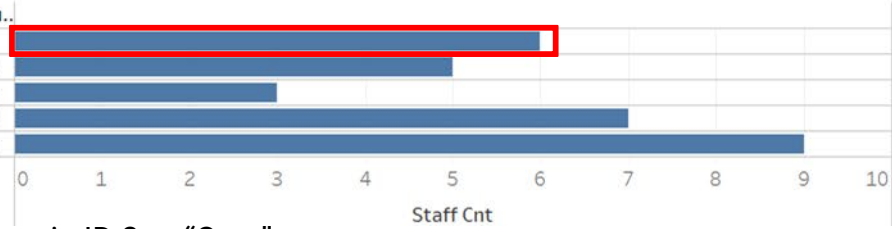

Refresh 2: Changed ID 2 first name to “Sarah” and Turnaround status in ID 3 to “Over”.

ID	rm ID	patient ID	Patient F..	Patient L..	Date	Turnarou..	Turnarou..	Turnarou..
1	1111	1001	John	Smith	2025-01-01	0:00:00	0:35:52	Over
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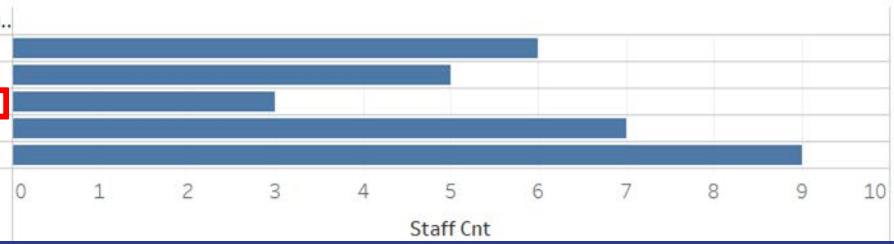
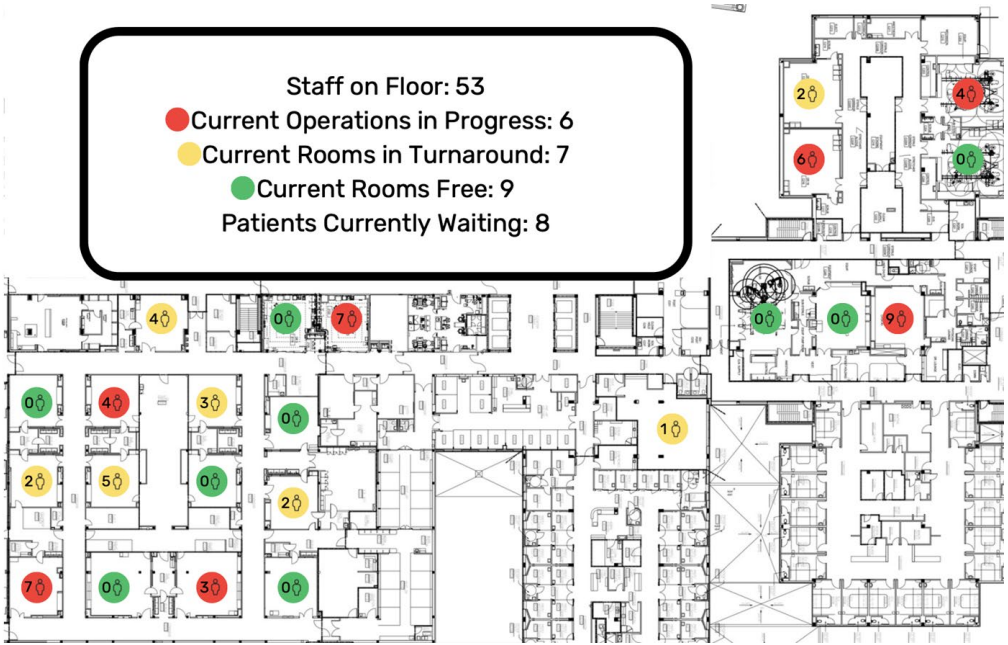


Dashboard Fall Iteration


Staff on Floor: 53
Current Operations in Progress: 6
Current Rooms in Turnaround: 7
Current Rooms Free: 9
Patients Currently Waiting: 8

Operating Room 12

Current Status: Turnaround

Elapsed Time: 25:07

Next scheduled operation: 3:42 PM

Current Staff in Room — 6

Dr. Emily Carter
Dr. Michael Thompson
Sophia Ramirez, RN
James Patel, Surgical Technologist
Liam Henderson, Circulating Nurse
Dr. Olivia Chen, Surgical Resident

Incoming Operation Info

Name: John Doe
Age: 42
Sex: M
Allergen: N/A
Operation: Cholecystectomy
ETA: 3:42 PM

Dashboard Spring Iteration (Beta)

Status1
- Available
- Cleaning
- Occupied

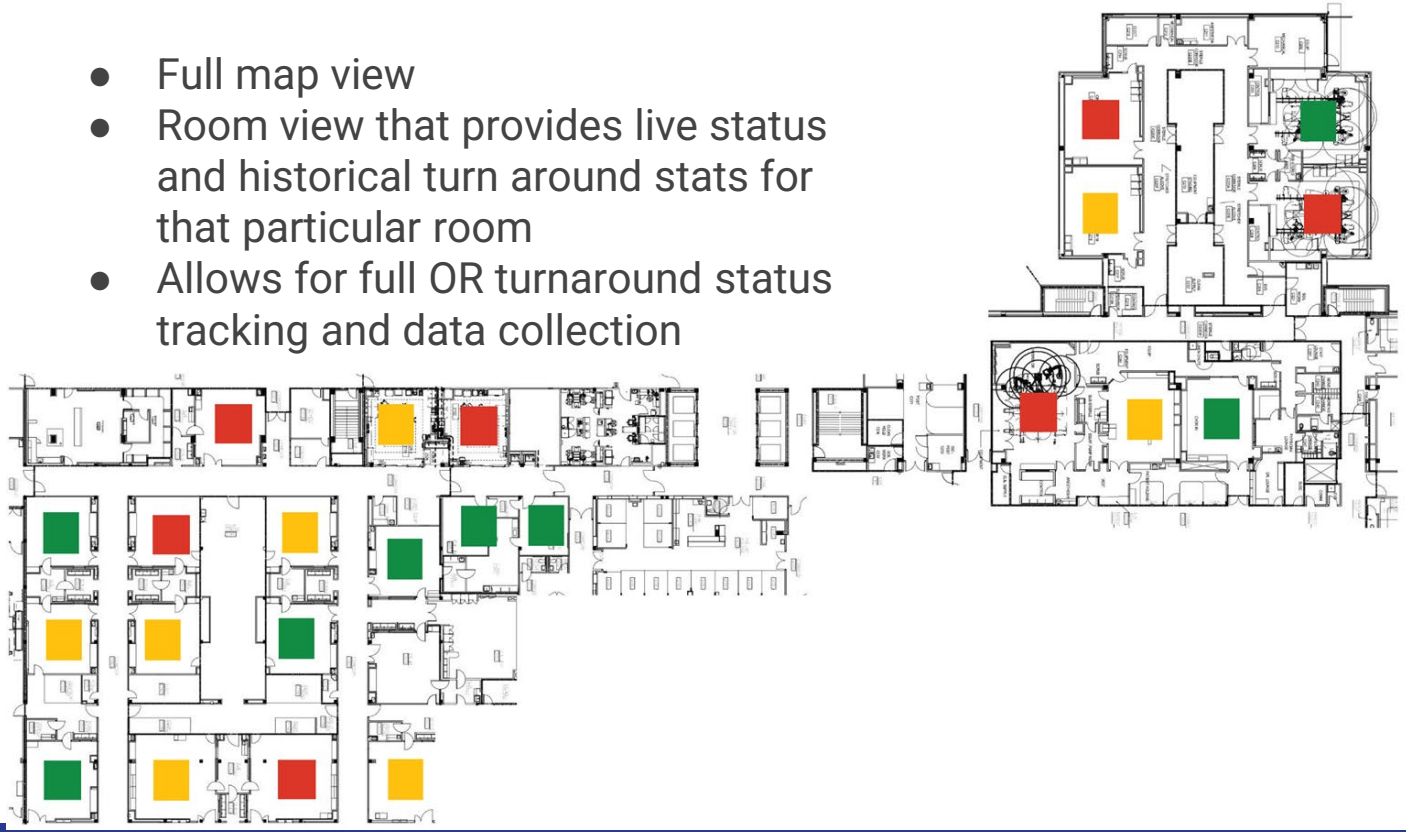
Room Details

Room Nam..	Status1
Room 4	Occupied

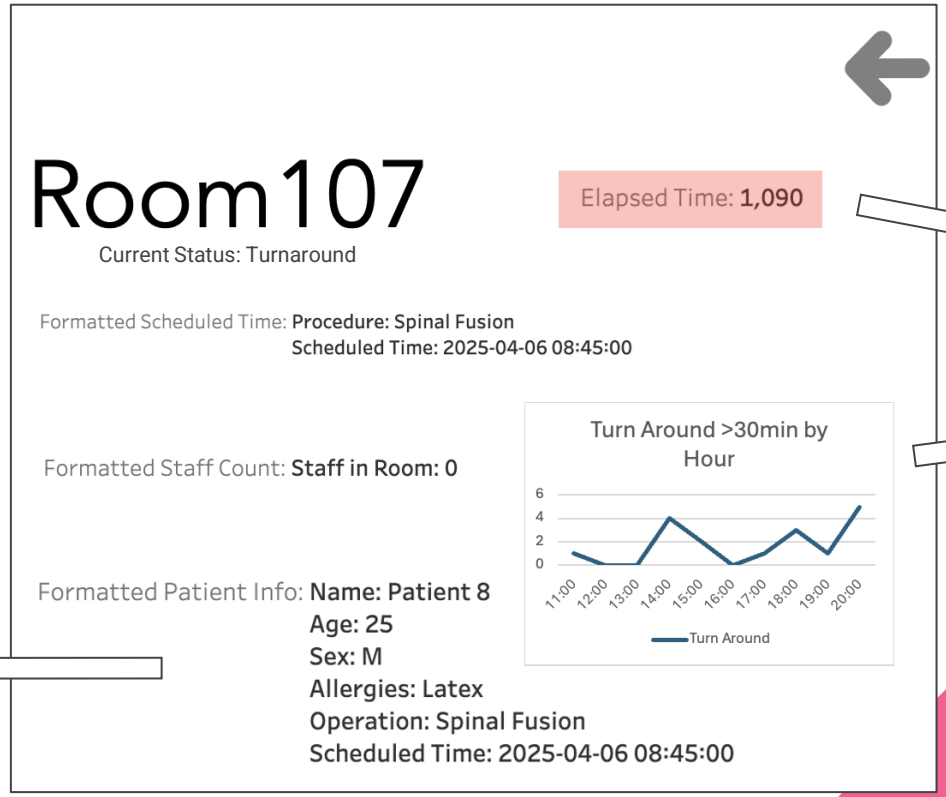
0 20 40 60 80 100 120 140 160 180 200 220

Dashboard Final Iteration (Map View)

- Full map view
- Room view that provides live status and historical turn around stats for that particular room
- Allows for full OR turnaround status tracking and data collection



Dashboard Final Iteration (Specific Room View)



Specific Room number with current status of room

Back button leading back to the map

When in turnaround a timer will run tracking the minutes passed for the turnaround

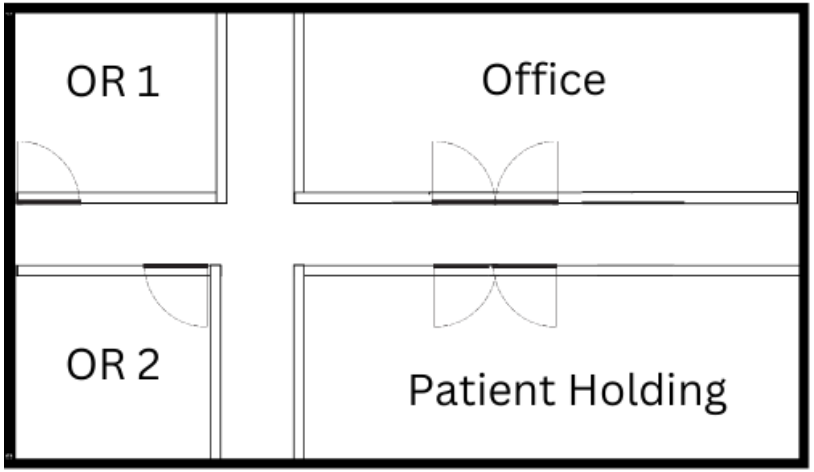
Current room information on upcoming procedure and staff count

Stats for the current room for the past 10 hours on if the goal of 30min turnaround was met

Incoming patient info

Physical Model Serves as Proof of Concept

1. **Scanner Setup**:
    - Scanner: Scans tags at door frame
    - Server API: Processes data and sends
    - to the dashboard
2. **Model Layout**:
    - 2 ORs, 1 Office, 1 Patient Holding area
    - QR codes at entrances and exits of rooms
    - 3D printed figures on a set track to display patient moving from room to room



Real-Time Visualization:

- Server transmits data to our dashboard
- Dashboard shows real-time locations within the OR

Final state of project

Final State:

- We created a real time updating dashboard that updates every 5 seconds, utilizing a server to communicate the database to the dashboard.
- The dashboard is fully accessible in **Tableau**.
- Our model will use scanners located at doorways to send information to the dashboard and it will update upon entering and exiting a room.

Recommended Improvements

- Another dashboard tool instead of Tableau for real-time data implementation
- Another year to flesh out this concept, whether they would like to add security features or implement ways of tracking info between rooms
    - We’ve provided proof of concept for this implementation including the dashboard itself

Thank You!
Any Questions?